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Source of collimated multi-MeV photons driven by radiation-reaction of an electron beam in a self-generated magnetic field[1] DAVID J. STARK, ALEXEY V. AREFIEV, Institute for Fusion Studies, The University of Texas at Austin, Austin, TX, USA, TOMA TONCIAN, Center for High Energy Density Science, The University of Texas at Austin, Austin, TX, USA — Several facilities are due to be commissioned in the next few years that will operate at intensities above 5×10^{22} W/cm^2, which will open up the possibility of developing radiation-reaction driven gamma-ray sources. In this talk, we will present a promising setup in which a high intensity pulse irradiates a relativistically overdense target containing a relativistically transparent channel. The channel is employed to guide the laser pulse, thus allowing stable propagation, and to enable generation of energetic electrons in the underdense region via direct laser acceleration. The resulting electron beam is collimated and, as expected, the photon emission due to the electron interaction with the laser pulse itself is low. Efficient and directed emission by the beam is triggered in this setup by a quasi-static magnetic field generated by the longitudinal electron current driven by the laser in the channel. We have performed 2D simulations of a laser-plasma interaction in this setup using PIC code EPOCH that includes a photon emission module. The simulations show that over 5% of laser energy at an intensity of 5×10^{22} W/cm^2 can be converted into a collimated beam of photons with energies above 20 MeV.

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